Advanced Lightweight Microclimate Cooling System (ALMCS)

Overview:

The **Advanced Lightweight Microclimate Cooling System (ALMCS)** is a very lightweight, state-of-the-art, man-portable microclimate cooling system designed to provide personal cooling to personnel wearing insulative protective clothing in high heat stress environments.

Description:

The ALMCS is an electrically driven vapor cycle cooler that circulates a chilled fluid through a heat transfer garment, lined with a network of tubing. Metabolic heat from the wearer is transferred to the fluid, which is pumped to the ALMCS where the heat is rejected. The coolant fluid is re-chilled and re-circulated back to the heat transfer garment. The ALMCS operates on two BA-5590 lithium sulfur dioxide ($LiSO_2$) batteries, although a third battery may be added for enhanced performance.

Specifications:

- Cooling Capacity/Rate (two BA-5590 $LiSO_2$ batteries): 700 watt-hours/230 watts in a 95°F ambient
- Comfortable cooling delivery temperature: 65-70°F
- Three hour duration on two BA-5590 $LiSO_2$ batteries
- Weight: 11 pounds (with two batteries)
- Volume: 0.25 ft^3 (6½"x $4^1/_8$" x 16¼")
- Energy Efficient: 4 Amps (two batteries)/ 6 Amps (three batteries) at 24 Volts DC
- Refrigerant: HFC, R-134A (non-ozone depleting)

Status:

The ALMCS is a microclimate cooling research prototype that represents a breakthrough in the development of personal coolers. Significant weight and volume reductions over previous state-of-the-art systems were achieved through the development of a miniature rolling piston compressor and innovative packaging designs. The ALMCS is ready to transition to engineering development.

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